EXHIBIT 4

(19)中华人民共和国国家知识产权局

(12)发明专利申请

(10)申请公布号 CN 105491555 A
(43)申请公布日 2016.04.13

(21)申请号 201510929886.2

(22)申请日 2015.12.15

(71)申请人 深圳优克云联科技有限公司
地址 518000 广东省深圳市南山区学府路深圳软件产业基地1栋A座3层

(72)发明人 王斌 高文

(74)专利代理机构 深圳盛德大业知识产权代理事务所(普通合伙) 44333
代理人 贾振勇

(51)Int.Cl.
H04W 8/20(2009.01)
H04W 12/06(2009.01)
H04W 88/06(2009.01)

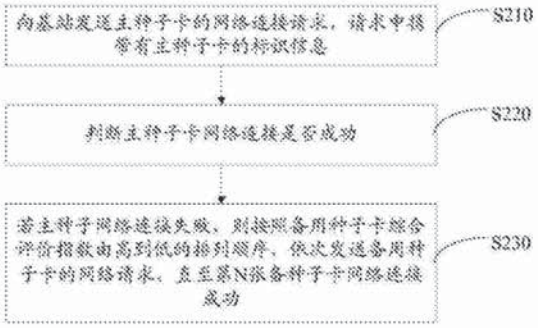
权利要求书2页 说明书7页 附图4页

(54)发明名称

一种网络接入的方法及装置

(57)摘要

本发明适用于通信领域，提供了一种网络接入方法，所述方法包括如下步骤：向基站发送主种子卡的网络连接请求，所述请求中携带有所述主种子卡的标识信息；判断所述主种子卡网络连接是否成功；若所述主种子卡网络连接失败，则按照备用种子卡综合评价指数由高到低的排列顺序，依次发送备用种子卡的网络请求，直至第N张备用种子卡网络连接成功。若主种子卡网络连接失败，向基站发送综合评价指数最高的备用种子卡的网络连接请求，直至有备用种子网络连接成功为止。上述方法能够有效的使用WiFi终端，节约成本。此外，还提供了一种网络接入装置。



CN 105491555 A

1.一种网络接入方法,其特征在于,所述方法包括如下步骤:

向基站发送主种子卡的网络连接请求,所述请求中携带有所述主种子卡的标识信息;

判断所述主种子卡网络连接是否成功;

若所述主种子卡网络连接失败,则按照备用种子卡综合评价指数由高到低的排列顺序,依次发送备用种子卡的网络请求,直至第N张备用种子卡网络连接成功。

2.如权利要求1所述的网路接入方法,其特征在于,所述综合评价指数的计算公式为:

综合评价指数=$A_1 \times a+B_1 \times b$

其中,A_1、B_1进行了归一化处理,A_1为信号强度,B_1为资费,a为赋予信号强度的权重,b为赋予资费的权重。

3.如权利要求1所述的网路接入方法,其特征在于,所述备用种子卡是出厂前写入到移动WIFI终端内的M张不同网络制式的软卡,或移动WIFI终端在开机首次正常上网时,后端服务器随机分配给移动WIFI终端的M张不同网络制式的软卡。

4.如权利要求1所述的网路接入方法,其特征在于,所述主种子卡和所述备用种子卡均为硬卡。

5.如权利要求1所述的网路接入方法,其特征在于,所述判断主种子卡网络连接是否成功的具体步骤包括:

接收基站返回的网络连接结果信息;

若该网络连接结果信息为网络连接成功的信息,则判定主种子卡网络连接成功,若该网络连接结果信息为网络连接失败的信息,则判定主种子卡网络连接失败。

6.如权利要求1所述的网路接入方法,其特征在于,所述判断主种子卡网络连接是否成功的具体步骤包括:

检测在设定的时间内是否接收到基站返回的网络连接成功的信息;

若在设定的时间内接收到基站返回的网络连接成功的信息,则判断主种子卡网络连接成功,否则,判断主种子卡网络连接失败。

7.一种网络接入装置,其特征在于,所述网络接入装置包括:

主卡网络连接模块,用于向基站发送主种子卡的网络连接请求,所述请求中携带有所述主种子卡的标识信息;

网络连接判断模块,用于判断所述主种子卡网络连接是否成功;

备用卡网络连接模块,若所述主种子卡网络连接失败,则所述备用卡网络连接模块用于按照备用种子卡综合评价指数由高到低的排列顺序,依次发送备用种子卡的网络请求,直至第N张备用种子卡网络连接成功。

8.如权利要求7所述的网路接入装置,其特征在于,所述综合评价指数的计算公式为:

综合评价指数=$A_1 \times a+B_1 \times b$

其中,A_1、B_1进行了归一化处理,A_1为信号强度,B_1为资费,a为赋予信号强度的权重,b为赋予资费的权重。

9.如权利要求7所述的网路接入装置,其特征在于,所述备用种子卡是出厂前写入到移动WIFI终端内的M张不同网络制式的软卡,或移动WIFI终端在开机首次正常上网时,后端服务器随机分配给移动WIFI终端的M张不同网络制式的软卡。

10.如权利要求7所述的网路接入装置,其特征在于,所述主种子卡和所述备用种子卡

均为硬卡。

11.如权利要求7所述的网路接入装置,其特征在于,所述网络连接判断模块包括:

接收单元,用于接收基站返回的网络连接结果信息;

第一主卡判定单元,用于当该网络连接结果信息为网络连接成功的信息,则判定主种子卡网络连接成功;若该网络连接结果信息为网络连接失败的信息,则判定主种子卡网络连接失败。

12.如权利要求7所述的网路接入装置,其特征在于,所述网络连接判断模块包括:

检测单元,用于检测在设定的时间内是否接收到基站返回的网络连接成功的信息;

第二主卡判定单元,用于当在设定的时间内接收到基站返回的网络连接成功的信息,则判断主种子卡网络连接成功,否则,判断主种子卡网络连接失败。

一种网络接入的方法及装置

技术领域

[0001] 本发明属于通信领域，尤其涉及一种网络接入方法及装置。

背景技术

[0002] 随着科学技术的进步及人民生活水平的提高，世界各国人民的沟通和交流越来越紧密，越来越多的人走出国门，去往异国工作、学习、旅游等，身在异国他乡的人们对网络的依赖程度就会大大增加，查地图看线路，搜索一下当地旅游攻略，与国内的朋友联系等，这些网络服务的实现都需要耗费网络流量。因此，移动WIFI终端(Wireless-Fidelity，无线保真)成为了出国人士的必备品。

[0003] 目前的移动WIFI终端一般安装或写入一张全球漫游卡，称之为种子卡(Seed SIM，SSIM卡)，在使用过程中，可能出现SSIM损坏、所在地没有该SSIM支持的网络，或者SSIM过期等现象，致使开机时该SSIM无法成功注册网络，导致SSIM卡与后端服务器(SIM-Sever)无法进行通信，致使SIM-Sever无法获知移动WIFI终端所在地的位置信息及网络信息，SIM-Sever就无法根据移动WIFI终端所在地的位置信息及网络信息分配当地的VSIM卡(Virtual SIM，虚拟SIM卡)，导致用户无法使用或者需要支付昂贵的漫游费。

发明内容

[0004] 本发明实施例提供一种网络接入方法，旨在解决用户无法使用或需要支付昂贵的漫游费的问题。

[0005] 本发明实施例是这样实现的，一种网络接入方法，包括如下步骤：

[0006] 向基站发送主种子卡的网络连接请求，所述请求中携带有所述主种子卡的标识信息；

[0007] 判断所述主种子卡网络连接是否成功；

[0008] 若所述主种子卡网络连接失败，则按照备用种子卡综合评价指数由高到低的排列顺序，依次发送备用种子卡的网络请求，直至第N张备用种子卡网络连接成功。

[0009] 本发明实施例还提供一种网络接入装置，所述网络接入装置包括：

[0010] 主卡网络连接模块，用于向基站发送主种子卡的网络连接请求，所述请求中携带有所述主种子卡的标识信息；

[0011] 网络连接判断模块，用于判断所述主种子卡网络连接是否成功；

[0012] 备用卡网络连接模块，若所述主种子卡网络连接失败，则所述备用卡网络连接模块用于按照备用种子卡综合评价指数由高到低的排列顺序，依次发送备用种子卡的网络请求，直至第N张备用种子卡网络连接成功。

[0013] 在本发明实施例中，若主种子卡网络连接成功，则建立主种子卡与后端服务器的数据连接，以使后端服务器能根据主种子卡上报的移动WIFI终端的位置信息、移动WIFI终端支持各网络制式及支持的网络制式的信号强度信息，分配对应的本地虚拟SIM卡给移动WIFI终端；若主种子卡网络连接失败，向基站发送综合评价指数最高的备用种子卡的网络

连接请求，若综合评价指数最高的备用种子卡网络连接成功，则建立主种子卡与后端服务器的数据连接，若综合评价指数最高的备用种子卡网络连接不成功，则根据备用种子卡的综合评价指数的排列顺序，向基站发送综合评价指数第二的备用种子卡的网络连接请求，依次类推，直至有备用种子网络连接成功为止。能够有效的使用WiFi终端，节约成本。

附图说明

[0014] 图1是本发明实施例提供的网络接入方法的网络实施环境图；

[0015] 图2是本发明实施例提供的网络接入方法的流程图；

[0016] 图3是本发明一实施例提供的判断主种子卡网络连接是否成功的流程图；

[0017] 图4是本发明另一实施例提供的判断主种子卡网络连接是否成功的流程图；

[0018] 图5是本发明实施例提供的网络接入装置的模块结构示意图；

[0019] 图6是本发明一实施例提供的网络连接判断模块的模块结构示意图；

[0020] 图7是本发明又一实施例提供的网络连接判断模块的模块结构示意图。

具体实施方式

[0021] 为了使本发明的目的、技术方案及优点更加清楚明白，以下结合附图及实施例，对本发明进行进一步详细说明。应当理解，此处所描述的具体实施例仅仅用以解释本发明，并不用于定本限发明。

[0022] 在本发明实施例中，若主种子卡网络连接成功，则建立主种子卡与后端服务器3的数据连接，以使后端服务器3能根据主种子卡上报的移动WIFI终端的位置信息、移动WIFI终端支持各网络制式及支持的网络制式的信号强度信息，分配对应的本地虚拟SIM卡给移动WIFI终端；若主种子卡网络连接失败，向基站发送综合评价指数最高的备用种子卡的网络连接请求，若综合评价指数最高的备用种子卡网络连接成功，则建立主种子卡与后端服务器3的数据连接，若综合评价指数最高的备用种子卡网络连接不成功，则根据备用种子卡的综合评价指数的排列顺序，向基站2发送综合评价指数第二的备用种子卡的网络连接请求，依次类推，直至有备用种子网络连接成功为止。能够有效的使用WiFi终端，节约成本。

[0023] 图1为本发明实施例提供的网络接入方法的网络实施环境图，为了便于说明，仅示出了与本发明实施例相关的部分。

[0024] 移动WIFI终端1用于在异地给用户提供本地上网服务，移动WIFI终端1内固定放置有一张全球漫游的SIM卡，该SIM卡是硬卡或写入到移动WIFI终端1的软卡(Soft SIM)，称之为主种子卡。

[0025] 开机时，主种子卡搜索移动WIFI终端1所在地的网络信息，该网络信息至少包括所在地支持的网络制式及网络制式对应的信号强度。

[0026] 基站2用于对移动WIFI终端1的种子卡进行鉴权。

[0027] 在本发明实施例中，当移动WIFI终端1开机时，移动WIFI终端1内的主种子卡或备用种子卡(后面详细介绍)需要向基站2发送接鉴权请求，该请求中携带有IMSI(International Mobile Subscriber Identification Number，国际移动用户识别码)、Ki(Key Identifier，手机鉴权密钥)和RAND(参数伪随机数)鉴权参数，基站2根据鉴权参数进行运算，并返回运算的结果，WIFI终端1的将基站2返回的运算结果与自身的运算结果进行

比较，若运算结果一致，判断该种子卡其是否为其合法客户，则为其提供上网通道。

[0028] 后端服务器3用于给移动WIFI终端1分配备用种子卡。

[0029] 在本发明实施例中，备用种子卡为全球漫游的软卡，移动WIFI终端1在开机首次正常上网时后端服务器3分配给移动WIFI终端1的，在移动WIFI终端1开机时，当主种子卡不能正常与后端服务器3进行通信时，就通过备用种子卡与后端服务器3进行通信。

[0030] 在本发明实施例中，后端服务器3内的备用种子用卡池内存储的备用种子卡，备用种子卡是按照网络制式进行分类的，后端服务器3从备用种子卡池中选取不同网络制式的备用种子卡，并分配给移动WIFI终端1。

[0031] 作为本发明的另一个实施例，备用种子卡还可以是出厂前写入到移动WIFI终端1内的。

[0032] 图2为本发明实施例提供的一种网络接入方法的流程图，详细如下：

[0033] 在步骤S210中，向基站发送主种子卡的网络连接请求，请求中携带有主种子卡的标识信息。

[0034] 在本发明实施例中，当移动WIFI终端1开机时，移动WIFI终端1内的主种子卡或备用种子卡(后面详细介绍)需要向基站2发送接鉴权请求，该请求中携带有IMSI(International Mobile Subscriber Identification Number，国际移动用户识别码)、Ki(Key Identifier，手机鉴权密钥)和RAND(参数伪随机数)鉴权参数，基站2根据鉴权参数进行运算，并返回运算的结果，WIFI终端1的将基站2返回的运算结果与自身的运算结果进行比较，若运算结果一致，判断该种子卡其是否为其合法客户，则为其提供上网通道。

[0035] 在步骤S220中，判断主种子卡网络连接是否成功。

[0036] 在本发明实施例中，网络连接具体包括以下三个步骤：主种子卡的鉴权、网络拨号及网络数据连接，只有以上三个步骤都成功的进行了，网络连接才算成功完成，当中任何一个步骤进行不成功，则导致网络连接失败。

[0037] 在本发明实施例中，若所在地没有主种子卡支持的网络信号、主种子卡在高温下发生变形或者是主种子卡由于外力的作用出现松动，都会导致主种子卡网络连接失败。

[0038] 在步骤S230中，若主种子网络连接失败，则按照备用种子卡综合评价指数由高到低的排列顺序，依次发送备用种子卡的网络请求，直至第N张备种子卡网络连接成功。

[0039] 在本发明实施例中，备用种子卡为全球漫游的软卡，移动WIFI终端1在开机首次正常上网时后端服务器3分配给移动WIFI终端1的，在移动WIFI终端1开机时，当主种子卡不能正常与后端服务器3进行通信时，就通过备用种子卡与后端服务器3进行通信。

[0040] 在本发明实施例中，后端服务器3内的备用种子用卡池内存储的备用种子卡，备用种子卡是按照网络制式进行分类的，后端服务器3从备用种子卡池中选取不同网络制式的备用种子卡，并分配给移动WIFI终端1。

[0041] 在本发明实施例中，若主种子卡网络连接成功，则建立主种子卡与后端服务器3的数据连接，以使后端服务器3能根据主种子卡上报的移动WIFI终端的位置信息、移动WIFI终端支持各网络制式及支持的网络制式的信号强度信息，分配对应的本地虚拟SIM卡给移动WIFI终端；若主种子卡网络连接失败，向基站发送综合评价指数最高的备用种子卡的网络连接请求，若综合评价指数最高的备用种子卡网络连接成功，则建立主种子卡与后端服务器3的数据连接，若综合评价指数最高的备用种子卡网络连接不成功，则根据备用种子卡的

综合评价指数的排列顺序，向基站2发送综合评价指数第二的备用种子卡的网络连接请求，依次类推，直至有备用种子网络连接成功为止。能够有效的使用WiFi终端，节约成本。

[0042] 备用种子卡的综合评价指数是根据备用种子卡的性能参数对备用种子作出优劣的评估，在本发明实施例中，备用种子卡的综合评价指数是根据信号强度及资费进行评价的，如通过赋予信号强度及资费以不同的权重，根据权重计算权值，权值即为综合评价指数，综合评价指数的计算公式为：

[0043] 综合评价指数＝$A_1 \times a + B_1 \times b$

[0044] 其中，A_1、B_1进行了归一化处理，A_1为信号强度参数，B_1为资费参数，a为赋予信号强度参数(A_1)的权重，b为赋予资费参数(B_1)的权重。

[0045] 在本发明实施例中，权重是可以根据用户的需要进行设定，根据用户对资费参数和信号强度参数的要求等级，赋予资费参数及信号强度参数以不同的权重。

[0046] 在本发明实施例中，移动WIFI终端内分配有M张备用种子卡，由于在正常情况下主种子卡都能正常使用，只有在少数情况下才会用到备用种子卡，只有在综合评价指数最高的备用种子卡也不能正常使用的时候，才会使用综合评价指数第二的备用种子卡，出于对成本的考虑，通常在移动WIFI终端设置3～5张备用种子卡即可，所以M的取值范围一般为3～5，因而N得取值范围$1 \leq N \leq M$。

[0047] 在一个实施例中，备用种子卡是出厂前写入到移动WIFI终端内的M张不同网络制式的软卡，或移动WIFI终端在开机首次正常上网时，后端服务器随机分配给移动WIFI终端的M张不同网络制式的软卡。

[0048] 在另一个实施例中，主种子卡和备用种子卡均为硬卡。

[0049] 本发明实施例通过在移动WIFI终端1设置备用种子卡，当主种子网络连接失败时，由备用种子卡按照综合评价指数由高到低的顺序依次进行网络连接，直至第N张备用种子卡网络连接成功，并通过第N张备用种子与后端服务器3建立通信，以使后端服务器3能根据种子卡上报的移动WIFI终端的位置信息、移动WIFI终端支持各网络制式及支持的网络制式的信号强度信息，分配对应的本地虚拟SIM卡给移动WIFI终端，以使用户能通过本地的网络进行上网，可以大大减少用户在异国的上网成本。

[0050] 图3为本发明实施例一提供的判断主种子卡网络连接是否成功的流程图，详细如下：

[0051] 在步骤S310中，接收基站返回的网络连接结果信息。

[0052] 在步骤S320中，若该网络连接结果信息为网络连接成功的信息，则判定主种子卡网络连接成功，若该网络连接结果信息为网络连接失败的信息，则判定主种子卡网络连接失败。

[0053] 图4为本发明实施例二提供的判断主种子卡网络注册是否成功的流程图，详细如下：

[0054] 在步骤S410中，检测在设定的时间内是否接收到基站返回的网络连接成功的信息。

[0055] 在步骤S420中，若在设定的时间内接收到基站返回的网络连接成功的信息，则判断主种子卡网络连接成功，否则，判断主种子卡网络连接失败。

[0056] 在本发明实施例中，只有在预设的时间内接收到基站返回的网络连接成功的信

息，则判定主种子卡网络连接成功，若在设定的时间内没有收到基站返回的信息，或者是在设定时间内接收到基站返回的网络连接失败的信息，则判定为主种子卡网络连接失败。

[0057] 本领域普通技术人员可以理解实现上述实施例的全部或部分步骤可以通过硬件来完成，也可以通过程序来指令相关的硬件完成，执行上述步骤的程序可以存储于一种计算机可读存储介质中，上述提到的存储介质可以是只读存储器，闪存，磁盘或光盘等。

[0058] 图5为本发明实施例提供的一种网络接入装置1的模块结构示意图，为了便于说明，仅示出了与本发明实施例相关的部分，详细如下：

[0059] 该网络接入装置1包括主卡网络连接模块10、网络连接判断模块20和备用卡网络连接模块30。

[0060] 主卡网络连接模块10用于向基站发送主种子卡的网络连接请求，所述请求中携带有所述主种子卡的标识信息。

[0061] 在本发明实施例中，当移动WIFI终端1开机时，移动WIFI终端1内的主种子卡或备用种子卡（后面详细介绍）需要向基站2发送接鉴权请求，该请求中携带有IMSI（International Mobile Subscriber Identification Number，国际移动用户识别码）、Ki（Key Identifier，手机鉴权密钥）和RAND（参数伪随机数）鉴权参数，基站2根据鉴权参数进行运算，并返回运算的结果，WIFI终端1将基站2返回的运算结果与自身的运算结果进行比较，若运算结果一致，判断该种子卡其是否为其合法客户，则为其提供上网通道。

[0062] 网络连接判断模块20用于判断所述主种子卡网络连接是否成功。

[0063] 在本发明实施例中，网络连接具体包括以下三个步骤：主种子卡的鉴权、网络拨号及网络数据连接，只有以上三个步骤都成功的进行了，网络连接才算成功完成，当中任何一个步骤进行不成功，则导致网络连接失败。

[0064] 在本发明实施例中，若所在地没有主种子卡支持的网络信号，主种子卡在高温下发生变形或者是主种子卡由于外力的作用出现松动，都会导致主种子卡网络连接失败。

[0065] 备用卡网络连接模块30用于当所述主种子卡网络连接失败，则所述备用卡网络连接模块30按照备用种子卡综合评价指数由高到低的排列顺序，依次发送备用种子卡的网络请求，直至第N张备用种子卡网络连接成功。

[0066] 在本发明实施例中，备用种子卡为全球漫游的软卡，移动WIFI终端1在开机首次正常上网时后端服务器3分配给移动WIFI终端1的，在移动WIFI终端1开机时，当主种子卡不能正常与后端服务器3进行通信时，就通过备用种子卡与后端服务器3进行通信。

[0067] 在本发明实施例中，后端服务器3内的备用种子用卡池内存储的备用种子卡，备用种子卡是按照网络制式进行分类的，后端服务器3从备用种子卡池中选取不同网络制式的备用种子卡，并分配给移动WIFI终端1。

[0068] 在本发明实施例中，若主种子卡网络连接成功，则建立主种子卡与后端服务器3的数据连接，以使后端服务器3能根据主种子卡上报的移动WIFI终端的位置信息、移动WIFI终端支持各网络制式及支持的网络制式的信号强度信息，分配对应的本地虚拟SIM卡给移动WIFI终端；若主种子卡网络连接失败，向基站发送综合评价指数最高的备用种子卡的网络连接请求，若综合评价指数最高的备用种子卡网络连接成功，则建立主种子卡与后端服务器3的数据连接，若综合评价指数最高的备用种子卡网络连接不成功，则根据备用种子卡的综合评价指数的排列顺序，向基站2发送综合评价指数第二的备用种子卡的网络连接请求，

依次类推，直至有备用种子网络连接成功为止。

[0069] 备用卡网络连接模块30按照备用种子卡综合评价指数由高到低的排列顺序，依次发送备用种子卡的网络请求，直至第N张备用种子卡网络连接成功。备用种子卡的综合评价指数是根据备用种子卡的性能参数对备用种子作出优劣的评估，在本发明实施例中，备用种子卡的综合评价指数是根据信号强度及资费进行评价的，如通过赋予信号强度及资费以不同的权重，根据权重计算权值，权值即为综合评价指数，综合评价指数的计算公式为：

[0070] 综合评价指数＝$A_1 \times a + B_1 \times b$

[0071] 其中，A_1、B_1进行了归一化处理，A_1为信号强度参数，B_1为资费参数，a为赋予信号强度参数(A_1)的权重，b为赋予资费参数(B_1)的权重。

[0072] 在本发明实施例中，权重是可以根据用户的需要进行设定，根据用户对资费参数和信号强度参数的要求等级，赋予资费参数及信号强度参数以不同的权重。

[0073] 在本发明实施例中，移动WIFI终端内分配有M张备用种子卡，由于在正常情况下主种子卡都能正常使用，只有在少数情况下才会用到备用种子卡，只有在综合评价指数最高的备用种子卡也不能正常使用的时候，才会使用综合评价指数第二的备用种子卡，出于对成本的考虑，通常在移动WIFI终端设置3～5张备用种子卡即可，所以M的取值范围一般为3～5，因而N得取值范围$1 \leq N \leq M$。

[0074] 在一个实施例中，备用种子卡是出厂前写入到移动WIFI终端内的M张不同网络制式的软卡，或移动WIFI终端在开机首次正常上网时，后端服务器随机分配给移动WIFI终端的M张不同网络制式的软卡。

[0075] 在另一个实施例中，主种子卡和备用种子卡均为硬卡。

[0076] 本发明实施例通过在移动WIFI终端1设置备用种子卡，当主种子网络连接失败时，由备用种子卡按照综合评价指数由高到低的顺序依次进行网络连接，直至第N张备用种子卡网络连接成功，并通过第N张备用种子与后端服务器3建立通信，以使后端服务器3能根据种子卡上报的移动WIFI终端的位置信息、移动WIFI终端支持各网络制式及支持的网络制式的信号强度信息，分配对应的本地虚拟SIM卡给移动WIFI终端，以使用户能通过本地的网络进行上网，可以大大减少用户在异国的上网成本。

[0077] 在一个具体的实施例中，如图6所示，网络连接判断模块20包括：接收单元21和第一主卡判定单元23。

[0078] 接收单元21用于接收基站返回的网络连接结果信息。

[0079] 第一主卡判定单元23用于当该网络连接结果信息为网络连接成功的信息，则判定主种子卡网络连接成功；若该网络连接结果信息为网络连接失败的信息，则判定主种子卡网络连接失败。

[0080] 在另一个具体的实施例中，如图7所示，网络连接判断模块20包括检测单元22和第二主卡判定单元24。

[0081] 检测单元22用于检测在设定的时间内是否接收到基站返回的网络连接成功的信息。

[0082] 第二主卡判定单元24用于当在设定的时间内接收到基站返回的网络连接成功的信息，则判断主种子卡网络连接成功，否则，判断主种子卡网络连接失败。

[0083] 在本发明实施例中，只有在预设的时间内接收到基站返回的网络连接成功的信

息，则第二主卡判定单元24判定主种子卡网络连接成功，若在设定的时间内没有收到基站返回的信息，或者是在设定时间内接收到基站返回的网络连接失败的信息，则第二主卡判定单元24判定为主种子卡网络连接失败。

[0084] 以上所述仅为本发明的较佳实施例而已，并不用以限制本发明，凡在本发明的精神和原则之内所作的任何修改、等同替换和改进等，均应包含在本发明的保护范围之内。

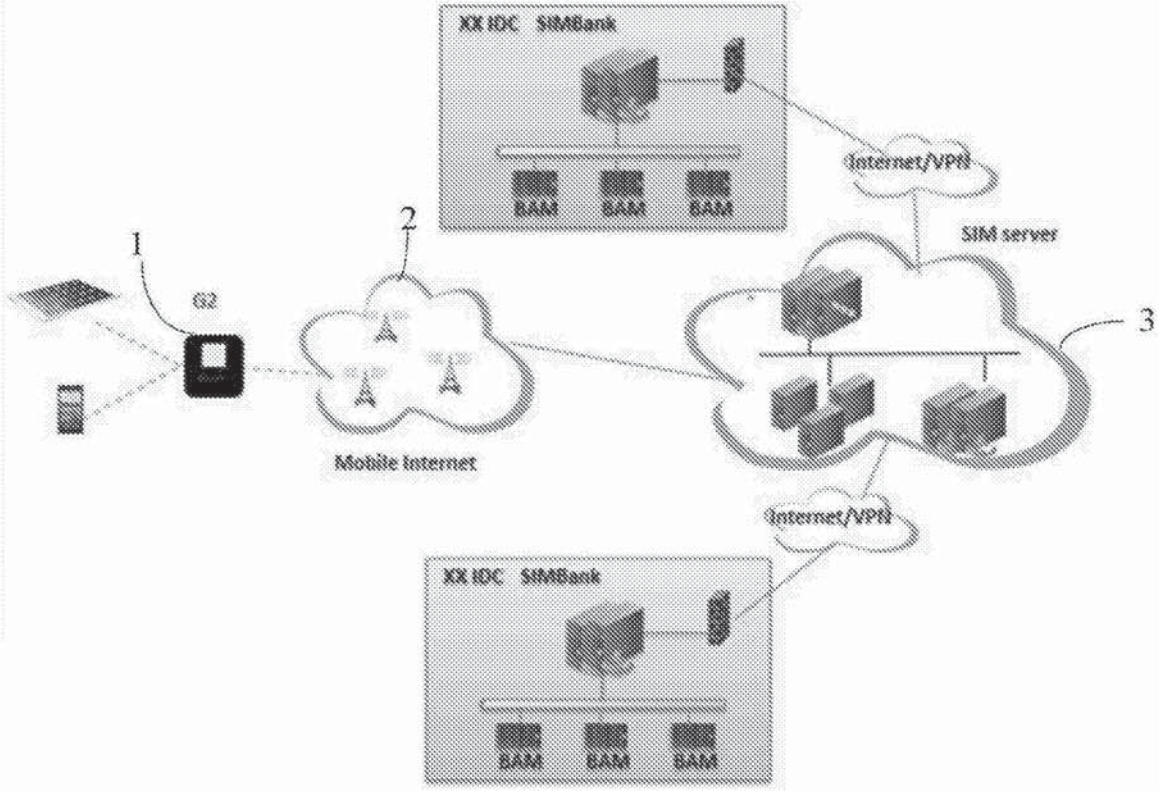

XX IDC SIMBank
SAM
SAM
SAM
Internet/VPN
SIM server
1
2
3
G2
Mobile Internet
Internet/VPN
XX IDC SIMBank
SAM
SAM
SAM

图1

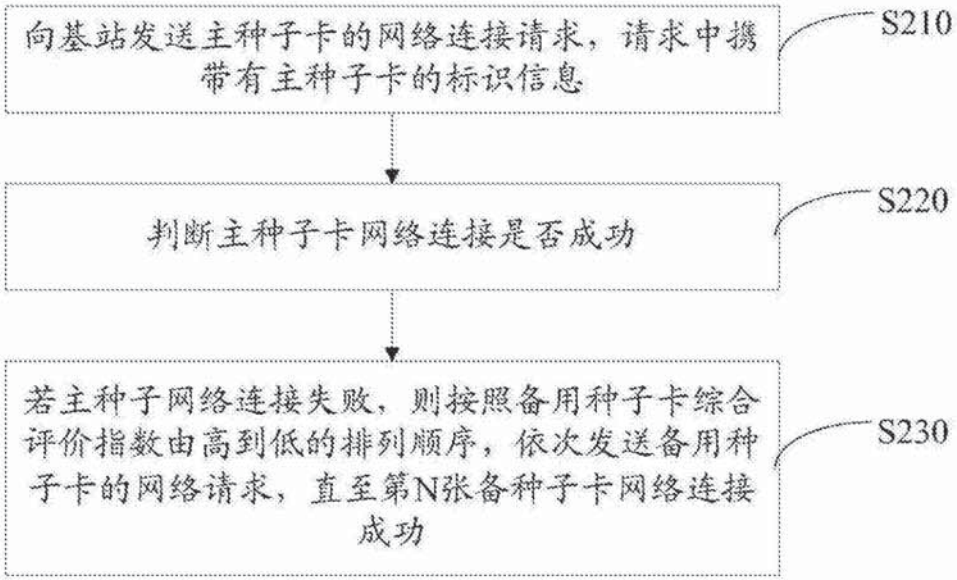

向基站发送主种子卡的网络连接请求，请求中携带有主种子卡的标识信息
S210
判断主种子卡网络连接是否成功
S220
若主种子网络连接失败，则按照备用种子卡综合评价指数由高到低的排列顺序，依次发送备用种子卡的网络请求，直至第N张备种子卡网络连接成功
S230

图2

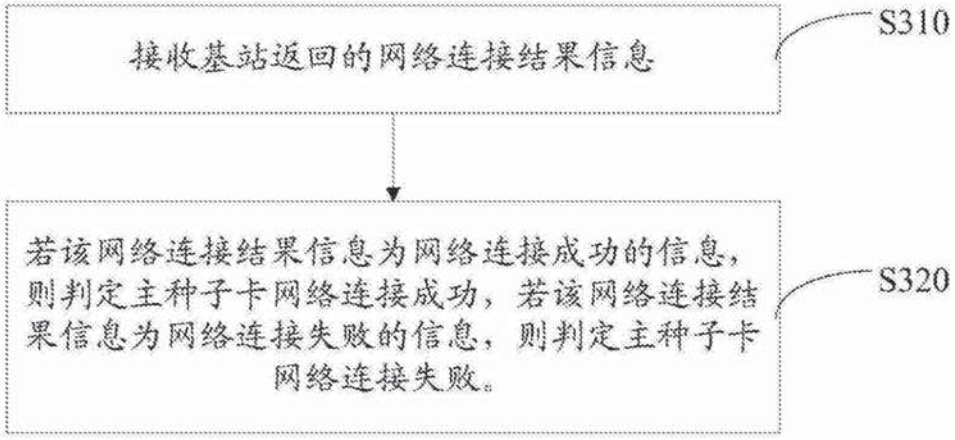

接收基站返回的网络连接结果信息
S310
若该网络连接结果信息为网络连接成功的信息，则判定主种子卡网络连接成功，若该网络连接结果信息为网络连接失败的信息，则判定主种子卡网络连接失败。
S320

图3

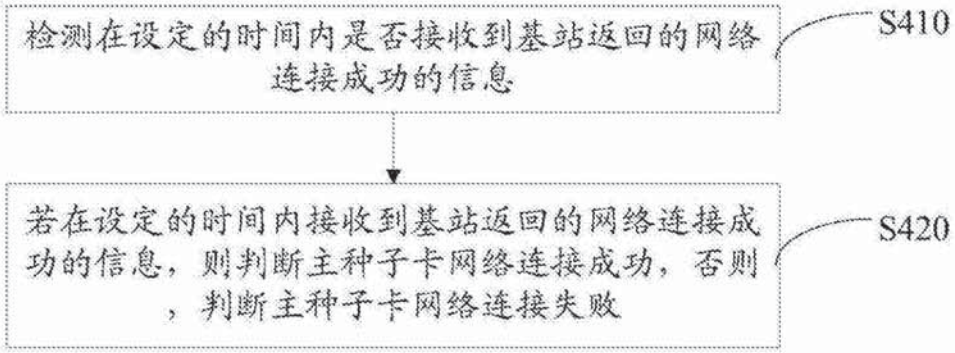

检测在设定的时间内是否接收到基站返回的网络连接成功的信息
S410
若在设定的时间内接收到基站返回的网络连接成功的信息，则判断主种子卡网络连接成功，否则，判断主种子卡网络连接失败
S420

图4

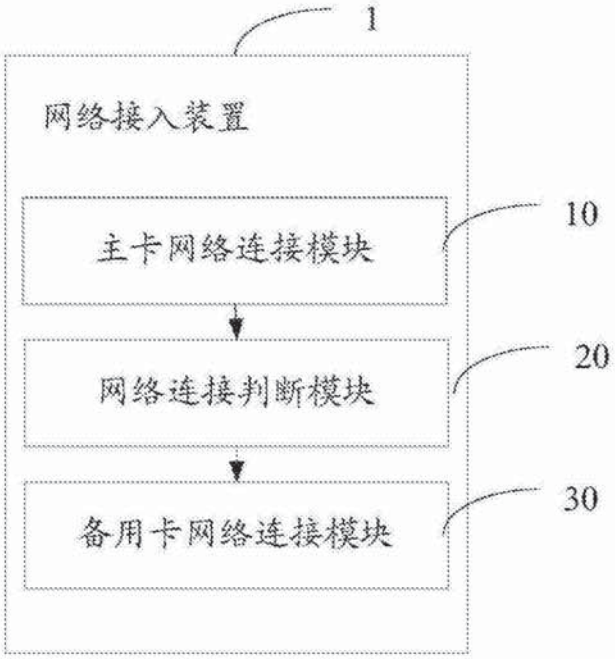

1
网络接入装置
主卡网络连接模块
10
网络连接判断模块
20
备用卡网络连接模块
30

图5

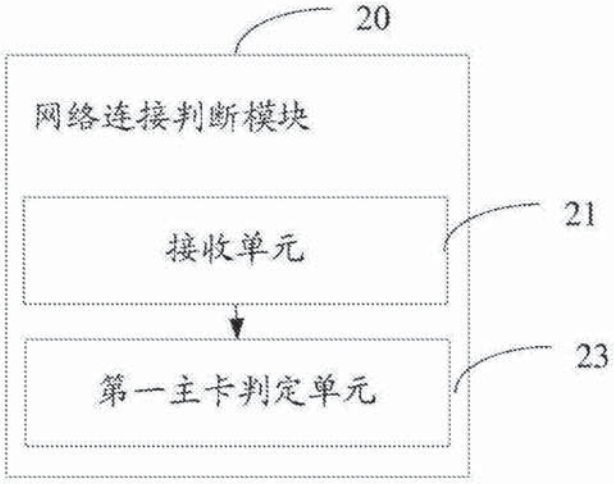

20
网络连接判断模块
接收单元
21
第一主卡判定单元
23

图6

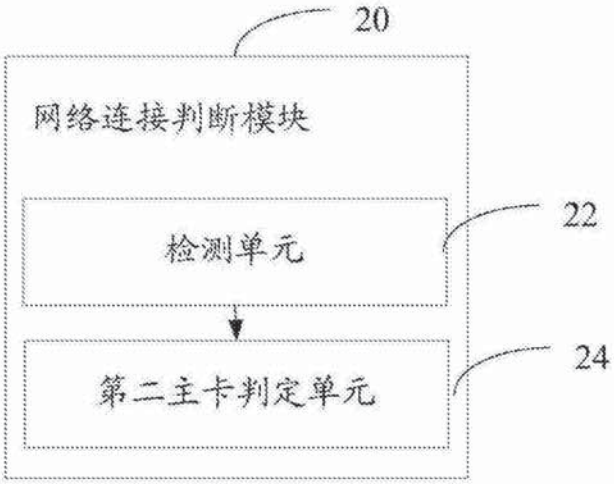


图7

[19] The Intellectual Property Office of the People's Republic of China

[12] Invention Patent Application

[10] Announcement No.: CN 105491555 A

[43] Announcement date: April 13, 2016

[21] Application No.: 201510929886.2

[22] Application date: December 15, 2015

[73] Patentee: Shenzhen UCLOUD LINK Technology Co., Ltd

Add: F3, Tower A, Building 1, Shenzhen Software Industrial Park, Xuefu Road, Nanshan District, Shenzhen, Guangdong, 518000

[72] Inventors: Bin Wang, Wen Gao

[74] **Patent agency**: Shenzhen Shengde Daye Patent Firm

[51] Int. Cl.

H04W 8/20 (2009.01)

H04W 12/06 (2009.01)

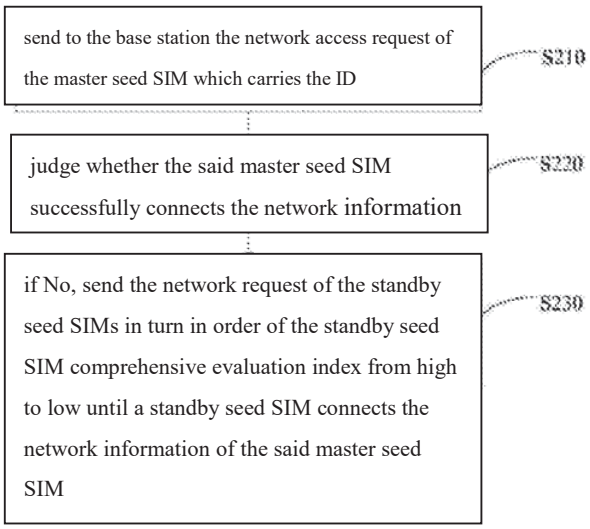
H04W 88/06 (2009.01)

Claims 2 pages Descriptions 7 pages Drawings 4 pages

[54] Name of the utility model: A network access method and device

[57] Abstract

The present invention is applicable to communication field and provides a network access method, comprising following procedures: send to the base station the network access request of the master seed SIM which carries the ID information of the said master seed SIM; judge whether the said master seed SIM successfully connects the network; if No, send the network request of the standby seed SIMs in turn in order of the standby seed SIM comprehensive evaluation index from high to low until a standby seed SIM connects the network. If the network connection of the master seed SIM fails, send the network access request of the standby seed SIM with the highest comprehensive evaluation index until the standby seed SIM connects the network. The afore method could effectively use the WiFi terminal and save costs. Besides, the present invention provides a network access device.



CN 105491555 A

---

1. A network access method, wherein it comprises following procedures:

Send to the base station the network access request of the master seed SIM which carries the ID information of the said master seed SIM;

Judge whether the said master seed SIM successfully connects the network;

If the said master SIM fails to connect the network, send the network request of the standby seed SIMs in turn in order of the standby seed SIM comprehensive evaluation index from high to low until a standby seed SIM connects the network.

2. A network access method as described in claim 1, wherein the calculation formula for the said comprehensive evaluation index is as follows:

Comprehensive evaluation index= A1 × a + B1 ×b

Where, A1 and B1 are normalized, A1 refers to signal intensity, B1 refers to charge, a is the weight conferred upon signal intensity, b is the weight conferred upon charge.

3. A network access method as described in claim 1, wherein the said standby seed SIMs denote the SoftSIMs (n=M) with different network systems which have been written into the mobile WIFI terminal prior to shipment out of the factory, or the SoftSIMs (n=M) with different network systems that are assigned randomly by the backend server to the mobile WIFI terminal when the mobie WIFI terminal is powered on and accesses normally the network for the first time.

4. A network access method as described in claim 1, wherein the said master seed SIM and the said standby seed SIMs are hard cards.

5. A network access method as described in claim 1, wherein the specific procedures to determine whether the master seed SIM successfully connects the network comprise:

Receive the network connection result message returned by the base station;

If the network connection result is successful network connection, the master seed SIM is deemed connecting the network successfully; if the network connection result response is failed network connection, the master seed SIM is deemed unable to connect the network.

6. A network access method as described in claim 1, wherein wherein the specific procedures to determine whether the master seed SIM successfully connects the network comprise:

Test whether the successful network connection message returned by the base station is received within the specified time period;

If the successful network connection message returned by the base station is received within the specified time period, the master seed SIM is deemed with successful network connection, otherwise it is deemed with unsuccessful network connection.

7. A network access device, wherein, the said network access device comprises:

Master SIM network connection module, which is used to send the network connection request of the master seed SIM to the base station; the said request shall carry the ID information of the said master seed SIM;

Network connection judgment module, which is used to determine whether the said master seed SIM connects the network;

Standby card network connection module; if the said master seed SIM fails to connect the network, the said standby SIM network connection module is used to send in turn the network request of the standby seed SIMs in order of the comprehensive evaluation index of the standby seed SIM from high to low until a standby seed SIM connects the network.

8. A network access device as described in claim 7, wherein the calculation formula for the said comprehensive evaluation index is as follows:

Comprehensive evaluation index= A1×a + B1 ×b

where, A1 and B1 are normalized, A1 refers to signal intensity, B1 refers to charge, a is the weight conferred upon signal intensity, b is the weight conferred upon charge.

9. A network access device as described in claim 7, wherein the said standby seed SIMs denote the SoftSIMs (n=M) with different network systems which have been written into the mobile WIFI terminal prior to shipment out of the factory, or the SoftSIMs (n=M) with different network systems that are assigned randomly by the backend server to the mobile WIFI terminal when the mobie WIFI terminal is powered on and accesses normally the network for the first time.

10. A network access device as described in claim 7, wherein the said master seed SIM and the said standby seed SIMs are hard cards.

---

11. A network access device as described in claim 7, wherein the said network connection jdugment module comprises:

Receiving unit, for receiving the network connection result message returned by the base station;

Primary master SIM judgment unit, which determines the master SIM with successful network connection if the network connection result is successful network connection; otherwise determines the master SIM with unsuccessful network connection.

12. A network access device as described in claim 7, wherein the said network connection judgment module comprises:

Testing unit, for testing whether the successful network connection message returned by the base station is received within the specified time period;

Secondary master sim judgment unit, which determines the master SIM with successful network connection if the successful network connection message returned by the base station is received within the specified time period; otherwise determines the master SIM with unsuccessful network connection.

A network access method and device

Technical field

[0001] The present invention belongs to the communication field, and particularly pertains to a network access method and device.

Background technology

[0002] Along with the progress of scientific technologies and improvement of human life, people around the world are engaged in increasingly closer and more frequent communications and exchanges, and more and more people are going abroad for working, study and tourism. People in foreign lands are having growing reliance on network to consult a map for routes, search local touring guides and contact with domestic friends. All aforementioned network services would consume network traffic data. Therefore, mobile WIFI terminal (or Wireless- Fidelity) has become a necessity to people going abroad.

[0003] Current mobile WIFI terminals are generally installed or written with a global roaming SIM, called seed SIM (SSIM). However, in the course of use, SSIM damage, unavailability of networks supported by the SSIM in the local place or expiry of the SSIM might occur, which cause the SSIM unable to successfully register with the network when the mobile phone is powered on and unable to communicate with the backend server (SIM-server). As a result, the SIM-server would be unable to acquire the location information and network information at the place where the mobile WIFI terminal is located, and thus is impossible to assign local vsim (virtual SIM) in accordance with the position information and network information at the place where the WIFI terminal is located, causing the user unable to use the network or resulting in exorbitant roaming charges.

Invention contents

[0004] The embodiment of the present invention provides a network access method which is aimed to solve the problems that users are unable to use the network or have to pay expensive roaming charges.

[0005] The embodiment of the resent invention is realized as follows. It is a network access method, comprising following procedures:

[0006] Send to the base station the network access request of the master seed SIM which carries the ID information of the said master seed SIM;

[0007] Judge whether the said master seed SIM successfully connects the network;

[0008] If the said master SIM fails to connect the network, send the network request of the standby seed SIMs in turn in order of the standby seed SIM comprehensive evaluation index from high to low until a standby seed SIM connects the network.

[0009] The embodiment of the present invention also provides a network access device, which comprises:

[0010] Master SIM network connection module, which is used to send the network connection request of the master seed SIM to the base station; the said request shall carry the ID information of the said master seed SIM;

[0011] Network connection judgment module, which is used to determine whether the said master seed SIM connects the network;

[0012] Standby SIM network connection module; if the said master seed SIM fails to connect the network, the said standby SIM network connection module is used to send in turn the network request of the standby seed SIMs in order of the comprehensive evaluation index of the standby seed SIM from high to low until a standby seed SIM connects the network.

[0013] In the embodiment of the present invention, if the master SIM successfully connects the network, a data connection between the master SIM and the backend server would be established, so that the backend server may assign the corresponding local VSIM to the mobile WIFI terminal in accordance with the position information of the mobile WIFI terminal reported by the master SIM, network systems supported by the mobile WIFI terminal and the signal intensity of the supported network systems; if the master SIM is unable to connect the network, the network access request of the standby SIM with the highest comprehensive evaluation index would be sent to the base station; if the standby SIM with the highest comprehensive evaluation index successfully connects the network, a data connection between the master SIM and the backend server would be established; if the standby SIM with the highest comprehensive evaluation index fails to connect the network, the network

access request of the standby SIM with the second highest comprehensive evaluation index would be sent to the base station based on the order of the comprehensive evaluation index of the standy SIM; likewise, until a standby seed SIM connects the network. This could effectively harness the Wi-Fi terminal and save costs.

Descriptions of drawings

[0014] Figure 1 is the network implementation environment diagram for the network access method provided by the embodiment of the present invention;

[0015] Figure 2 is the flow diagram of the network access method provided by the embodiment of the present invention;

[0016] Figure 3 is the flow diagram for judging whether the master SIM successfully connects the network as provided by an embodiment of the present invention;

[0017] Figure 4 is the flow diagram for judging whether the master SIM successfully connects the network as provided by another embodiment of the present invention;

[0018] Figure 5 is the schematic diagram about the modular structure of the network access device provided by the embodiment of the present invention;

[0019] Figure 6 is the schematic diagram about the modular structure of the network connection judgment module provided by an embodiment of the present invention;

[0020] Figure 7 is the schematic diagram about the modular structure of the network connection judgment module provided by another embodiment of the present invention;

Specific embodiments

[0021] To elucidate the purpose, technical plan and advantages of the present invention, following sections provide further detailed explanations about the present invention in combination with the attached figures and embodiments. It should be noted that the specific embodiments hereof only serve for illustration of the present invention and do not confine the present invention.

[0022] In the embodiments of the present invention, if the master SIM successfully connects the network, a data connection between the master SIM and the backend server 3 would be established, so that the backend server 3 may assign the corresponding local VSIM to the mobile WIFI terminal in accordance with the position information of the mobile WIFI terminal reported by the master SIM, network systems supported by the mobile WIFI terminal and the signal intensity of the supported network systems; if the master SIM is unable to connect the network, the network access request of the standby SIM with the highest comprehensive evaluation index would be sent to the base station; if the standby SIM with the highest comprehensive evaluation index successfully connects the network, a data connection between the master SIM and the backend server 3 would be established; if the standby SIM with the highest comprehensive evaluation index fails to connect the network, the network access request of the standby SIM with the second highest comprehensive evaluation index would be sent to the base station 2 based on the order of the comprehensive evaluation index of the standy SIM; likewise, until a standby seed SIM connects the network. This could effectively harness the Wi-Fi terminal and save costs.

[0023] Figure 1 is the network implementation environment diagram for the network access method provided by the embodiment of the present invention. For the purpose of illustration, only the part related to the present invention embodiment is displayed.

[0024] The mobile WIFI terminal 1 is used to provide local network services to users in foreign lands. The mobile WIFI terminal 1 has a built-in global roaming SIM card, which is a hard card or a SoftSIM written into the mobile WIFI terminal 1, namely the master SIM.

[0025] When the mobile phone is powered on, the master SIM would search the network information at the place where the mobile WIFI terminal 1 is located, which should at least contain the network system supported in the local place and the corresponding signal intensity of the network system.

[0026] The base station 1 conducts authentication on the seed SIM of the mobile WIFI terminal 1.

[0027] In the embodiment of the present invention, when the mobile WIFI terminal 1 is switched on, the seed SIM or standby SIM in the mobile WIFI terminal (which will be introduced in details hereafter) needs to send to base station 2 the request to receive the authentication, which shall carry the IMSI (international mobile subscriber identification number), Ki (Key Identifier) and RAND authentication parameter. The base station 2 would conduct operations based on the authentication parameter and return the operation results; the WIFI terminal 1 would compare the

operation results returned by base station 2 and its own operation results; if afore two operation results are consistent, it will determine whether the seed SIM is its legal client and then provide network access.

[0028] The backend server 3 is used to assign the standby seed SIM to mobile WIFI terminal 1.

[0029] In the embodiment of the present invention, the standby seed SIMs are global roaming SoftSIMs, which are assigned to mobile WIFI terminal 1 by the backend server 3 when mobile WIFI terminal 1 is powered on and connects internet for the first time. If the master seed SIM is unable to communicate with the backend server 3 when the mobile WIFI terminal 1 is powered on, it will utilize the standby seed SIM for communication with the backend server 3.

[0030] In the embodiment of the present invention, the standby seed SIMs in the backend server 3 are those stored in the SIM pool. The standby seed SIMs are classified in accordance with network systems, and the backend server 3 selects standby seed SIMs of different network systems from the standby seed SIM pool and assign them to the mobile WIFI terminal 1.

[0031] In another embodiment of the present invention, the standby seed SIM may also be written into the mobile WIFI terminal 1 prior to shipment from the factory.

[0032] Figure 2 is the flow diagram of the network access method provided by the embodiment of the present invention, with the details as follows:

[0033] In step S210, send to the base station the network connection request of the master SIM, which shall carry the ID information of the master SIM.

[0034] In the embodiment of the present invention, when the mobile WIFI terminal 1 is switched on, the master seed SIM or standby seed SIM (introduced in details hereafter) in the mobile WIFI terminal 1 needs to send to base station 2 the request to receive the authentication, which shall carry the IMSI (international mobile subscriber identification number), Ki (Key Identifier) and RAND authentication parameter. The base station 2 would conduct operations based on the authentication parameter and return the operation results; the WIFI terminal 1 would compare the operation results returned by base station 2 and its own operation results; if afore two operation results are consistent, it will determine whether the seed SIM is its legal client and then provide network access.

[0035] In step 220, judge whether the master SIM successfully connects the network.

[0036] In the embodiment of the present invention, the network connection encompasses following three specific steps: master SIM authentication, network dialing and network data connection. Only after all above three steps succeed will the network be connected; the failure of any step would result in the failure of the network connection.

[0037] In the embodiment of the present invention, the network connection of the master SIM would fail if there are no network signals supported by the master SIM, occurrence of master SIM deformation under high temperature or loosening of the master SIM under external forces.

[0038] In step S230, if the master SIM fails to connect the network, then send in turn the network request of the standby seed SIM in order of the seed SIM comprehensive evaluation index from high to low until a stanby SIM connects the network.

[0039] In In the embodiment of the present invention, the standby SIMs are global roaming SoftSIMs, which are assigned to mobile WIFI terminal 1 by the backend server 3 when mobile WIFI terminal 1 is powered on and connects internet for the first time. If the master seed SIM is unable to communicate with the backend server 3 when the mobile WIFI terminal 1 is powered on, it will utilize the standby seed SIM for communication with the backend server 3.

[0040] In the embodiment of the present invention, the standby seed SIMs in the backend server 3 are those stored in the SIM pool. The standby seed SIMs are classified in accordance with network systems, and the backend server 3 selects standby seed SIMs of different network systems from the standby seed SIM pool and assign them to the mobile WIFI terminal 1.

[0041] In the embodiment of the present invention, if the master SIM successfully connects the network, a data connection between the master SIM and the backend server 3 would be established, so that the backend server 3 may assign the corresponding local VSIM to the mobile WIFI terminal in accordance with the position information of the mobile WIFI terminal reported by the master SIM, network systems supported by the mobile WIFI terminal and the signal intensity of the supported network systems; if the master SIM is unable to connect the network, the network access request of the standby SIM with the highest comprehensive evaluation index would be sent to the base station; if the standby SIM with the highest comprehensive evaluation index successfully connects the network, a data connection between the master SIM and the backend

server 3 would be established; if the standby SIM with the highest comprehensive evaluation index fails to connect the network, the network access request of the standby SIM with the second highest comprehensive evaluation index would be sent to the base station 2 based on the order of the comprehensive evaluation index of the standy SIM; likewise, until a standby seed SIM connects the network. This could effectively harness the WiFi terminal and save costs.

[0042] The seed SIM comprehensive evaluation index is an assessment on the advantages and disadvantages of the standby seeds based on the performance parameters of the standby SIMs. In the embodiment of the present invention, the standby seed SIM comprehensive evaluation index is graded based on signal intensity and charge; if the signal intensity and charge are conferred respectively with different weights, the weight values may be calculated based on weights, namely the comprehensive evaluation index. The calculation formula is as follows:

[0043] Comprehensive evaluation index= A1×a + B1 ×b

[0044] Where, A1 and B1 are normalized, A1 refers to signal intensity, B1 refers to charge, a is the weight conferred upon signal intensity (A1), b is the weight conferred upon charge (B1).

[0045] In the embodiment of the present invention, the weights may be set in light of the requirements of users. The parameters of charge and signal intensity are designated with different weights in light of the level of requirements by users on these two parameters.

[0046] In the embodiment of the present invention, the mobile WIFI terminal is configured with several (n=M) standby SIMs. Since the master SIM could work under normal circumstances, the standby SIMs would be used only under few conditions; besides, if the standby SIM with the highest comprehensive evaluation index does not function, the standby SIM with the second highest comprehensive evaluation index would be used. Therefore, for the consideration of costs, generally 3~5 standby seed SIMs are installed in the mobile WIFI terminal, so the range of M is generally 3~5, and 1≤N≤M.

[0047] In an embodiment, the standby SIMs refer to the several (n=M) SoftSIMs of different network systems written into the mobile WIFI terminal prior to shipment from the factory, or the SoftSIMs (n=M) with different network systems that are assigned randomly by the backend server to the mobile WIFI terminal when the mobile WIFI terminal is powered on and accesses normally the network for the first time.

[0048] In another embodiment, the master seed SIM and the standby seed SIMs are hard cards.

[0049] By configuration of standby SIMs in the mobile WIFI terminal in the present invention embodiment, if the master seed SIM fails to connect the network, the standby seed SIMs would attempt to access the network in order of the comprehensive evaluation index from high to low until a standby seed SIM successfully connects the network and establishes communication with the backend server 3, so that the backend server 3 may assign the corresponding local VSIM to the mobile WIFI terminal in accordance with the position information of the mobile WIFI terminal reported by the master SIM, network systems supported by the mobile WIFI terminal and the signal intensity of the supported network systems; thus the user may access the network via the local network, which may greatly cut down on the costs of network traffic data in foreign countries.

[0050] Figure 3 is the flow diagram for judging whether the master SIM successfully connects the network as provided by an embodiment of the present invention, with the details as follows:

[0051] In step S310, receive the network connection result message returned by the base station.

[0052] In step S320, if the network connection result is successful network connection, the master seed SIM is deemed having connected the network successfully; if the network connection result response is failed network connection, the master seed SIM is deemed unable to connect the network.

[0053] Figure 4 is the flow diagram for judging whether the network registration of the master seed SIM succeeds as provided in embodiment 2 of the present invention, with the details as follows:

[0054] In step S410, test whether the message about successful network connection returned by the base station has been received with the specified time period.

[0055] In step S420, if the message about successful network connection returned by the base station is received within the specified time period, the master seed SIM is deemed with successful network connection; otherwise, the master seed SIM is deemed with unsuccessful network connection.

[0056] In the present invention embodiment, only if the message about successful network connection returned by the base station is received

within the preset time period, the master seed SIM is deemed with successful network connection; if the message returned by the base station is not received within the set time or the message about the network connection failure returned by the base station is received within the specified time, the master seed SIM is deemed with unsuccessful network connection.

[0057] The ordinary technicians in the field related to the present art may understand that all or part of the procedures of the above embodiment may be realized by hardware, or by programs that command related hardware; the program for implementation of above step may be stored in a computer readable storage medium that may be read-only storage medium, flash memory, magnetic disk or optic disk.

[0058] Figure 5 is the schematic diagram about the modular structure of a network access device 1 provided by the embodiment of the present invention. For the purpose of illustration, only the part related the present invention embodiment is displayed, with the details as follows:

[0059] The network access device 1 comprises master SIM network connection module 10, network connection judgment module 20 and standby SIM network connection module 30.

[0060] The master SIM network connection module 10 is used to send to the base station the network connection request of the master SIM, which shall carry the ID information of the said master seed SIM.

[0061] In the embodiment of the present invention, when the mobile WIFI terminal 1 is switched on, the master seed SIM or standby SIM in the mobile WIFI terminal 1 (which will be introduced in details hereafter) needs to send to base station 2 the request to receive the authentication, which shall carry the IMSI (international mobile subscriber identification number), Ki (Key Identifier) and RAND authentication parameter. The base station 2 would conduct operations based on the authentication parameter and return the operaton results; the WIFI terminal 1 would compare the operation results returned by base station 2 and its own operation results; if afore two operation results are consistent, it will determine whether the seed SIM is its legal client and then provide network access.

[0062] The network connection judgment module 20 is used to determine whether the said master seed SIM connects the network.

[0063] In the embodiment of the present invention, the network connection encompasses following three specific steps: master SIM authentication, network dialing and network data connection. Only after all above three steps succeed will the network be connected; the failure of any step would result in the failure of the network connection.

[0064] In the embodiment of the present invention, the network connection of the master SIM would fail if there are no network signals supported by the master SIM, occurrence of master SIM deformation under high temperature or loosening of the master SIM under external forces.

[0065] When the said master seed SIM fails to connect the network, the standby SIM network connection module 30 is used to send in turn the network request of the standby seed SIMs in order of the comprehensive evaluation index of the standby seed SIM from high to low until a standby seed SIM connects the network.

[0066] In the embodiment of the present invention, the standby seed SIMs are global roaming SoftSIMs, which are assigned to mobile WIFI terminal 1 by the backend server 3 when mobile WIFI terminal 1 is powered on and connects internet for the first time. If the master seed SIM is unable to communicate with the backend server 3 when the mobile WIFI terminal 1 is powered on, it will utilize the standby seed SIM for communication with the backend server 3.

[0067] In the embodiment of the present invention, the standby seed SIMs in the bakend server 3 are those stored in the SIM pool. The standby seed SIMs are classified in accordance with network systems, and the backend server 3 selects standby seed SIMs of different network systems from the standby seed SIM pool and assign them to the mobile WIFI terminal 1.

[0068] In the embodiments of the present invention, if the master SIM successfully connects the network, a data connection between the master SIM and the backend server 3 would be established, so that the backend server 3 may assign the corresponding local VSIM to the mobile WIFI terminal in accordance with the position information of the mobile WIFI terminal reported by the master SIM, network systems supported by the mobile WIFI terminal and the signal intensity of the supported network systems; if the master seed SIM is unable to connect the network, the network access request of the standby SIM with the highest comprehensive evaluation index would be sent to the base station; if the standby SIM with the highest comprehensive evaluation index successfully connects the network, a data connection between the master SIM and the backend server 3 would be established; if the standby SIM with the highest comprehensive evaluation index fails to connect the network, the network access request of the standby SIM with the second highest comprehensive evaluation index would be sent to the base station 2 based on the order of the

comprehensive evaluation index of the standy SIM; likewise, until a standby seed SIM connects the network.

[0069] The standby SIM network connection module 30 is used to send in turn the network request of the standby seed SIMs in order of the comprehensive evaluation index of the standby seed SIM from high to low until a standby seed SIM connects the network. The seed SIM comprehensive evaluation index is an assessment on the advantages and disadvantages of the standby seeds based on the performance parameters of the standby SIMs. In the embodiment of the present invention, the standby seed SIM comprehensive evaluation index is graded based on signal intensity and charge; if the signal intensity and charge are conferred respectively with different weights, the weight values may be calculated based on weights, namely the comprehensive evaluation index. The calculation formula is as follows:

[0070] Comprehensive evaluation index= A1×a + B1 ×b

[0071] Where, A1 and B1 are normalized, A1 refers to signal intensity, B1 refers to charge, a is the weight conferred upon signal intensity (A1), b is the weight conferred upon charge (B1).

[0072] In the embodiment of the present invention, the weights may be set in light of the requirements of users. The parameters of charge and signal intensity are designated with different weights in light of the level of requirements by users on these two parameters.

[0073] In the embodiment of the present invention, the mobile WIFI terminal is configured with several (n=M) standby SIMs. Since the master SIM could work under normal circumstances, the standby SIMs would be used only under few conditions; besides, if the standby SIM with the highest comprehensive evaluation index does not function, the standby SIM with the second highest comprehensive evaluation index would be used. Therefore, out of the consideration of costs, generally 3~5 standby seed SIMs are installed in the mobile WIFI terminal, so the range of M is generally 3~5, and 1≤N≤M.

[0074] In an embodiment, the standby SIMs refer to the several (n=M) SoftSIMs of different network systems written into the mobile WIFI terminal prior to shipment from the factory, or the SoftSIMs (n=M) with different network systems that are assigned randomly by the backend server to the mobile WIFI terminal when the mobie WIFI terminal is powered on and accesses normally the network for the first time.

[0075] In another embodiment, the master seed SIM and the standby seed SIMs are hard cards.

[0076] By configuration of standby SIMs in the mobile WIFI terminal 1 in the present invention embodiment, if the master seed SIM fails to connect the network, the standby seed SIMs would attempt to access the network in order of the comprehensive evaluation index from high to low until a standby seed SIM successfully connects the network and establishes communication with the backend server 3, so that the backend server 3 may assign the corresponding local VSIM to the mobile WIFI terminal in accordance with the position information of the mobile WIFI terminal reported by the master SIM, network systems supported by the mobile WIFI terminal and the signal intensity of the supported network systems; thus the user may access the network via the local network, which may greatly cut down on the costs of network traffic data in foreign countries.

[0077] In a specific embodiment, as shown in Figure 6, the network connection judgement module 20 comprises: receiving unit 21 and primary master SIM judgment unit 23.

[0078] The receiving unit 21 is used to receive the network connection result message returned by the base station.

[0079] The primary master SIM judgment unit 23 is used to determine the master SIM with successful network connection if the network connection result is successful network connection; otherwise determine the master SIM with unsuccessful network connection.

[0080] In another specific embodiment, as shown in Figure 7, the network connection judgment module 20 CN encompasses the testing unit 22 and the secondary master SIM judgment unit 24.

[0081] The testing unit 22 is used to test whether the successful network connection message returned by the base station is received within the specified time period;

[0082] The secondary master SIM judgment unit determines the master SIM with successful network connection if the successful network connection message returned by the base station is received within the specified time period; otherwise determines the master SIM with unsuccessful network connection.

[0083] In the present invention embodiment, only if the message about successful network connection returned by the base station is received within the preset time period, the master seed SIM is deemed with successful network connection; if the message returned by the base station is

not received within the set time or the message about the network connection failure returned by the base station is received within the specified time, the network connection of the master seed SIM is deemed as failure.

[0084] The abovementioned only represent the preferred embodiments of the present invention and shall not limit the present invention. Any modification, equivalent replacement and improvement made within the spirit and principle of the present invention shall be included in the protection scope of the present invention.

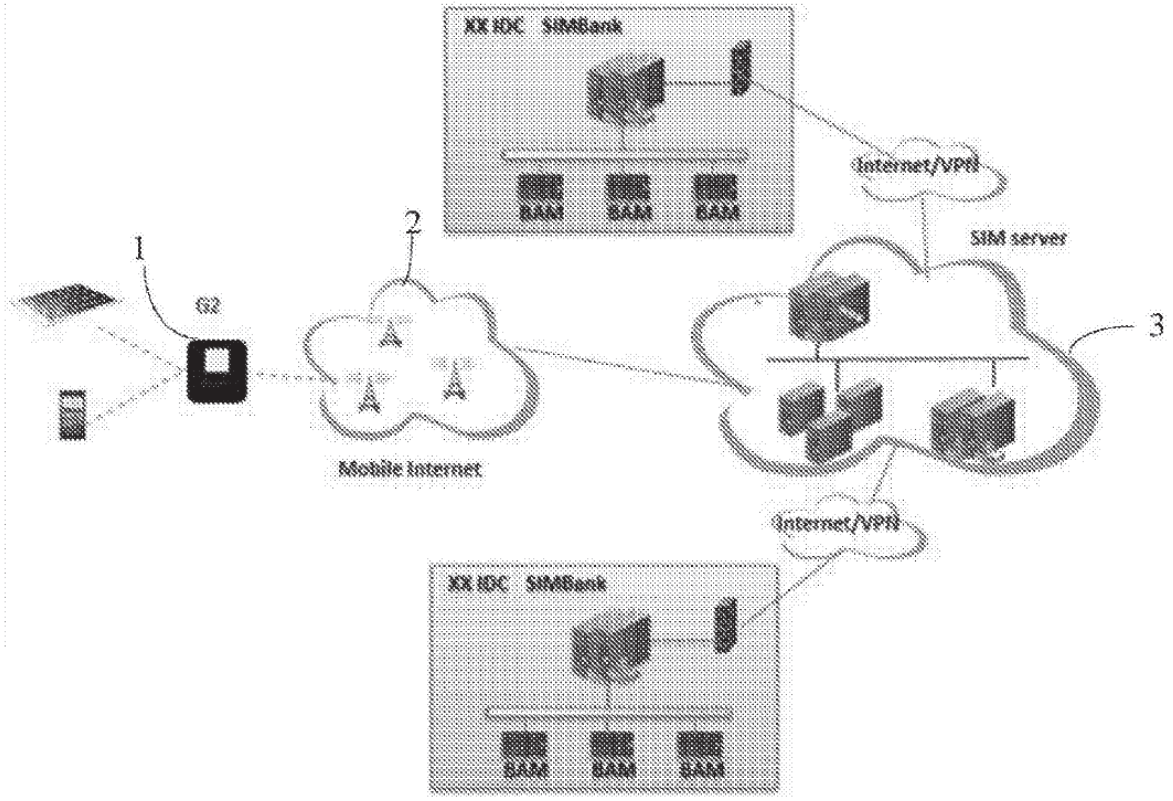


Figure 1

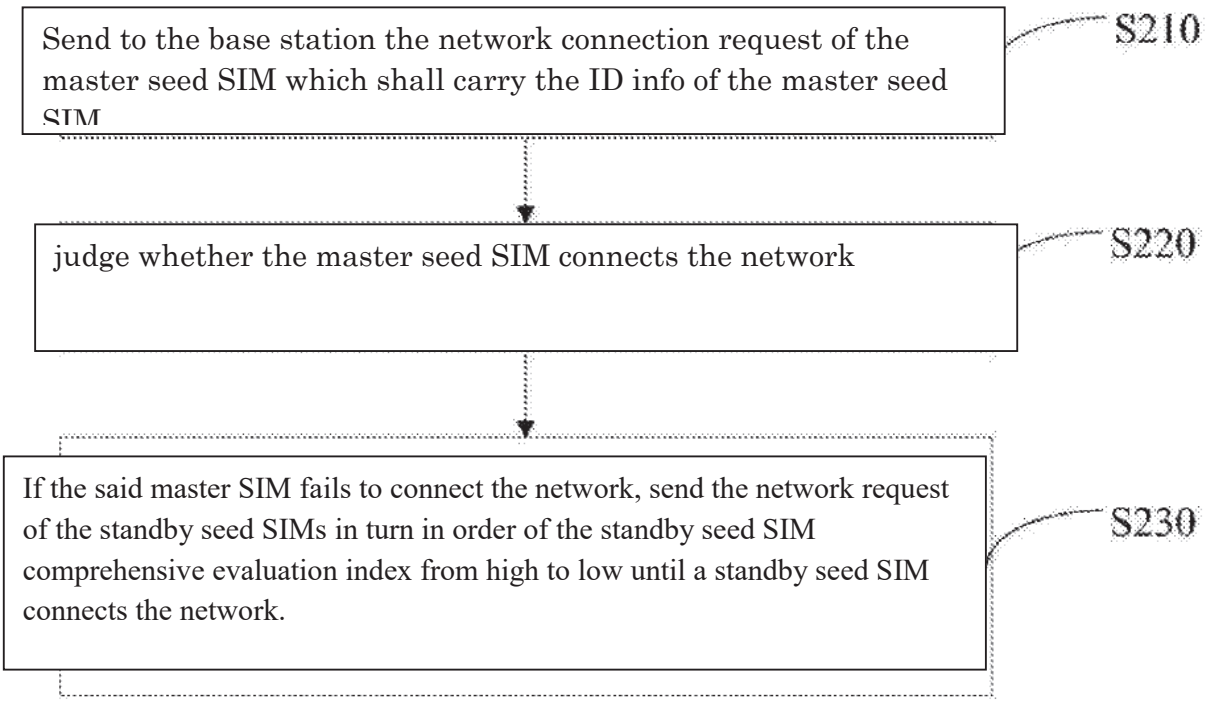


Figure 2

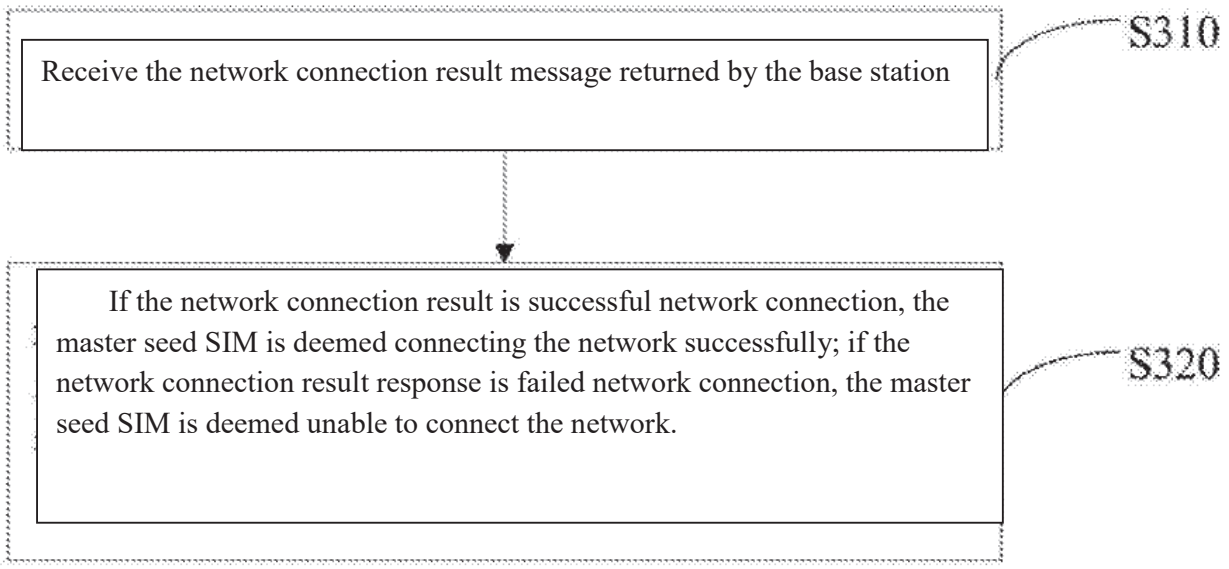


Figure 3

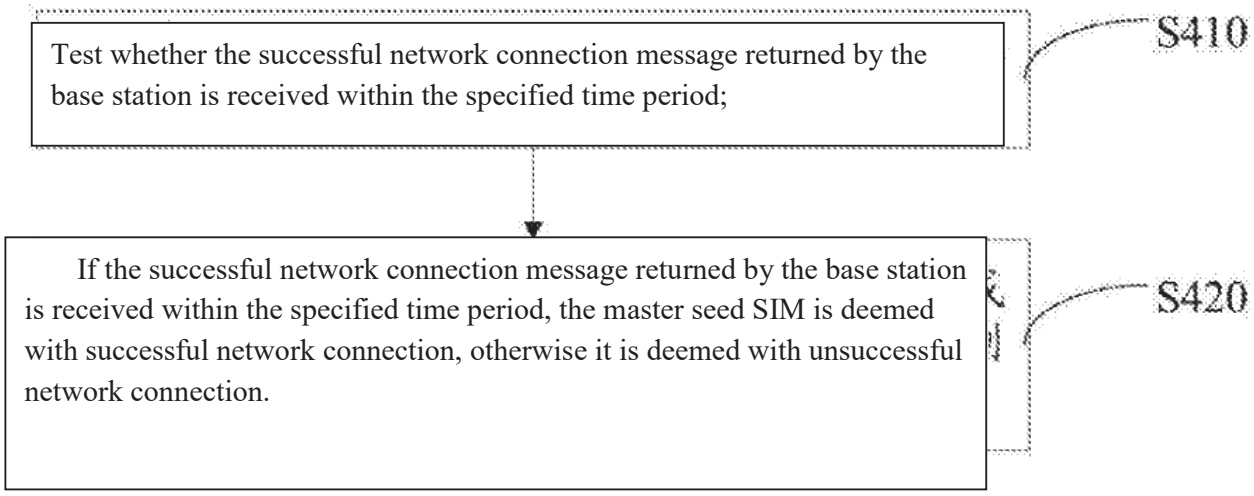


Figure 4

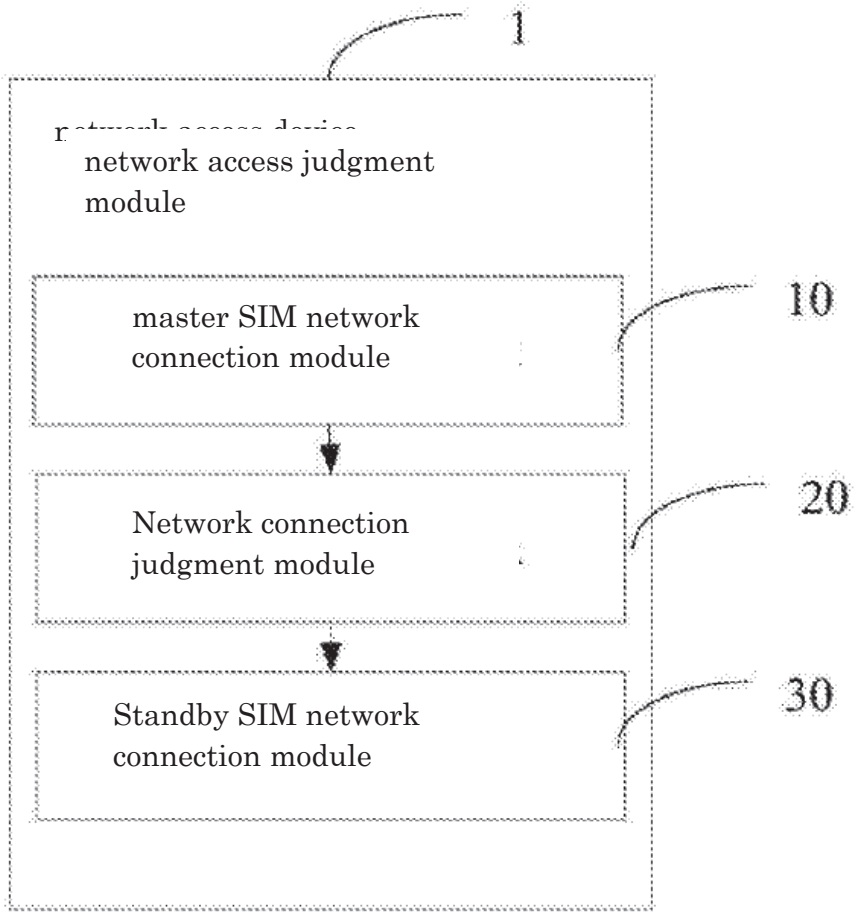


Figure 5

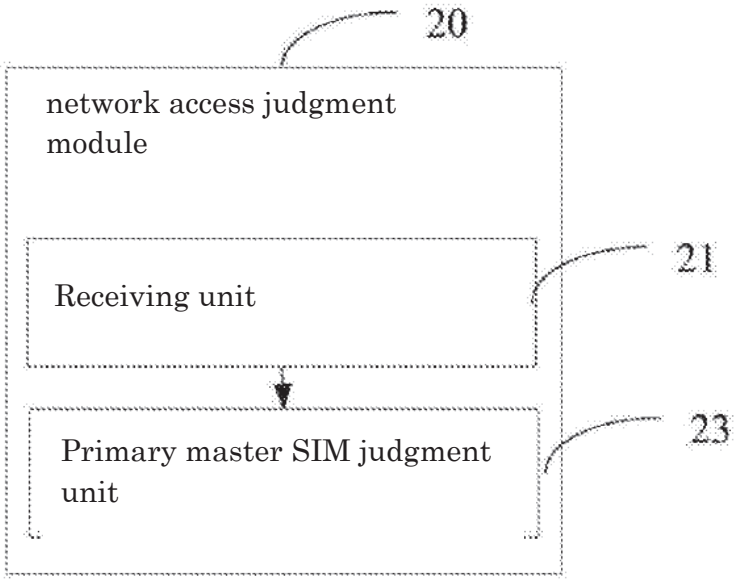


Figure 6

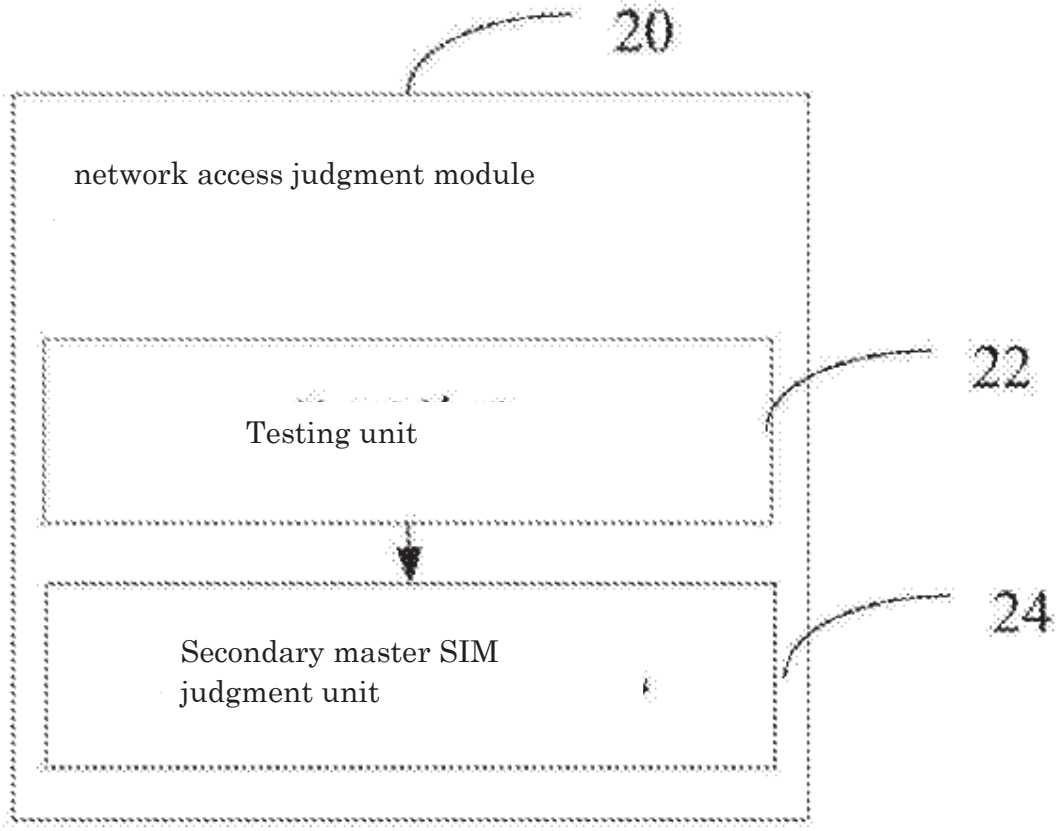

20
network access judgment module
22
Testing unit
24
Secondary master SIM judgment unit

Figure 7

TRANSPERFECT

City of New York, State of New York, County of New York

I, Aurora Landman, hereby certify that the document "CN105491555A" is to the best of my knowledge and belief, a true and accurate translation from Chinese into English.

Aurora Landman

Sworn to before me this
November 7, 2018

Signature, Notary Public

ANDERS MIKAEL EKHOLM
NOTARY PUBLIC-STATE OF NEW YORK
No. 01EK6378373
Qualified in New York County
My Commission Expires 07-23-2022

Stamp, Notary Public